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WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-111025U

VOLUME I

OPERATOR'S MANUAL

626-PA-6008

TEMPERATURE AND HUMIDITY MONITOR

Note

Refer to Volume 2 (Service Manual) of TM-111025 for maintenance data.

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626-PA-6008 TEMPERATURE AND HUMIDITY MONITOR

1 INTRODUCTION

This manual provides operating instructions for the 626-PA-6008 Temperature and Humidity Monitor Plug-in, hereinafter referred to as the 6008. The 6008 is designed for installation in the Model 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information described in TM-105650.

2 PURPOSE

The 6008 is a 2-channel module which monitors temperature and humidity. One channel monitors temperature from 0 to 100 degrees C; the other channel monitors relative humidity from 0 to 100% relative humidity (RH). With thresholds programmed by the user, the 6008 stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The 6008 monitors changes in any of these parameters, based on user programmable sensitivities and high and low limits. Each input takes eight readings over a 20-second period and then averages the readings to determine if a threshold or limit crossing has occurred. The sensitivity value of each type of disturbance, above which detection and printout occurs, is operator programmable. The time spent out of the user-programmable limits is also accumulated on a daily basis and made available from the data summary printouts. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a disturbance summary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

3 EQUIPMENT CHARACTERISTICS

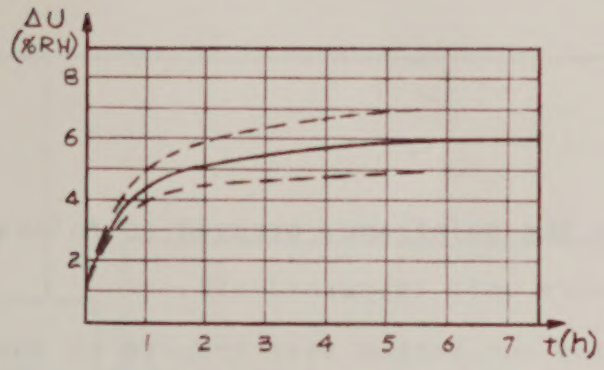
The 6008 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any one of the five slots of the Model 626 Universal Disturbance Analyzer. Technical specifications of the 6008 are listed in Table 1.

Table 1

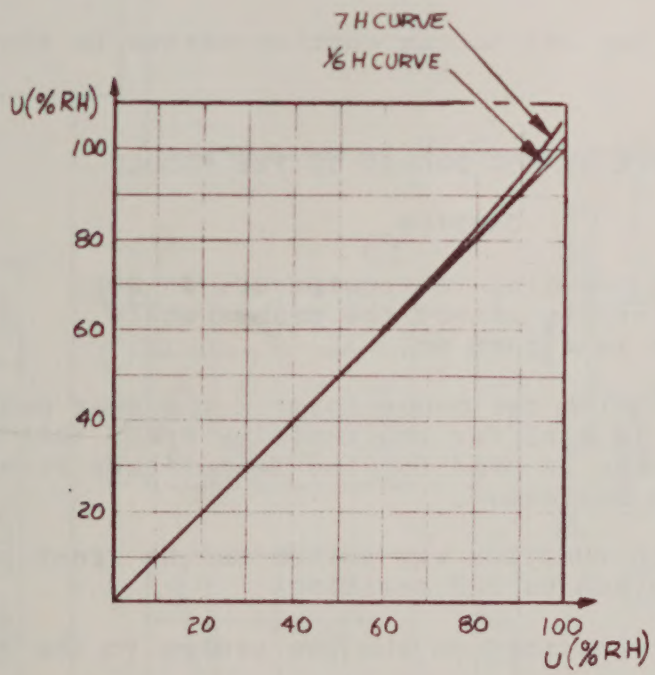
625-PA-6008 Specifications

Input Temperature	
Range:	1 to 100 deg C
Accuracy:	+/- 1 deg C
Cable Length:	100 ft max (30.5 m)
Cable Temperature:	105 deg C max
Input Relative Humidity	
Range:	0 to 80%* RH for 0 ≤ T ≤ 70 deg C
Accuracy:	+/- 3% RH +/- .05 (t-20) +/- .02 reading
Cable Length:	100 ft max (30.5 m)
Cable Temperature:	105 deg C max
Programmable Parameters	
Temperature	
Low limit	0 deg C min
High limit	102 deg C max
Sensitivity	1 deg C min max
Preset to	LO = 20, HI = 30, SENS = 2
Humidity	
Low limit	0% RH
High limit	102% RH
Sensitivity	1% RH min
Preset to	LO = 40, HI = 60, SENS = 5

* Note additional drift above 80% RH. (See figure 1.)



ADDITIONAL ERROR FOR EXTENDED TIME SPENT > 95 % RH



DRIFT DUE TO EXTENDED TIME AT HIGH HUMIDITY

NOTE: UNIT SHOULD BE CALIBRATED AFTER SEVERAL HOURS AT HIGH HUMIDITY IF IS INTENDED TO BE USED IN THIS MANNER

Figure 1. Effect of High Humidity on Drift

4 INSTALLATION

To install the 6008 in the mainframe, proceed as follows:

CAUTION: Be sure unit is turned off.

a. Position the top and bottom rear corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firml seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframme.

5 CONNECTING THE SENSOR PROBES TO THE MODULE

CAUTION

To avoid damaging the equipment, do not connect or disconnect the probes while the unit is turned on.

The 6008 is supplied with two connectors on the rear panel. The 6-contact connector is used for the Humidity Probe (DEL P/N 111067) and the 3-contact connector is used for the Temperature Probe (DEL P/N 111059). Proceed as follows:

a. Insert key in FUNCTION key switch on the front panel of the mainframe and set switch to OFF position.

b. Attach the connectors on the two probes to the appropriate rear panel connectors.

6 OPERATING THE 6008

6.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with the 6008 are described in Table 2. Figure 2 shows the typical front panel controls on a Model 626. For a description of controls common to overall Model 626 operation, refer to TM-106650.

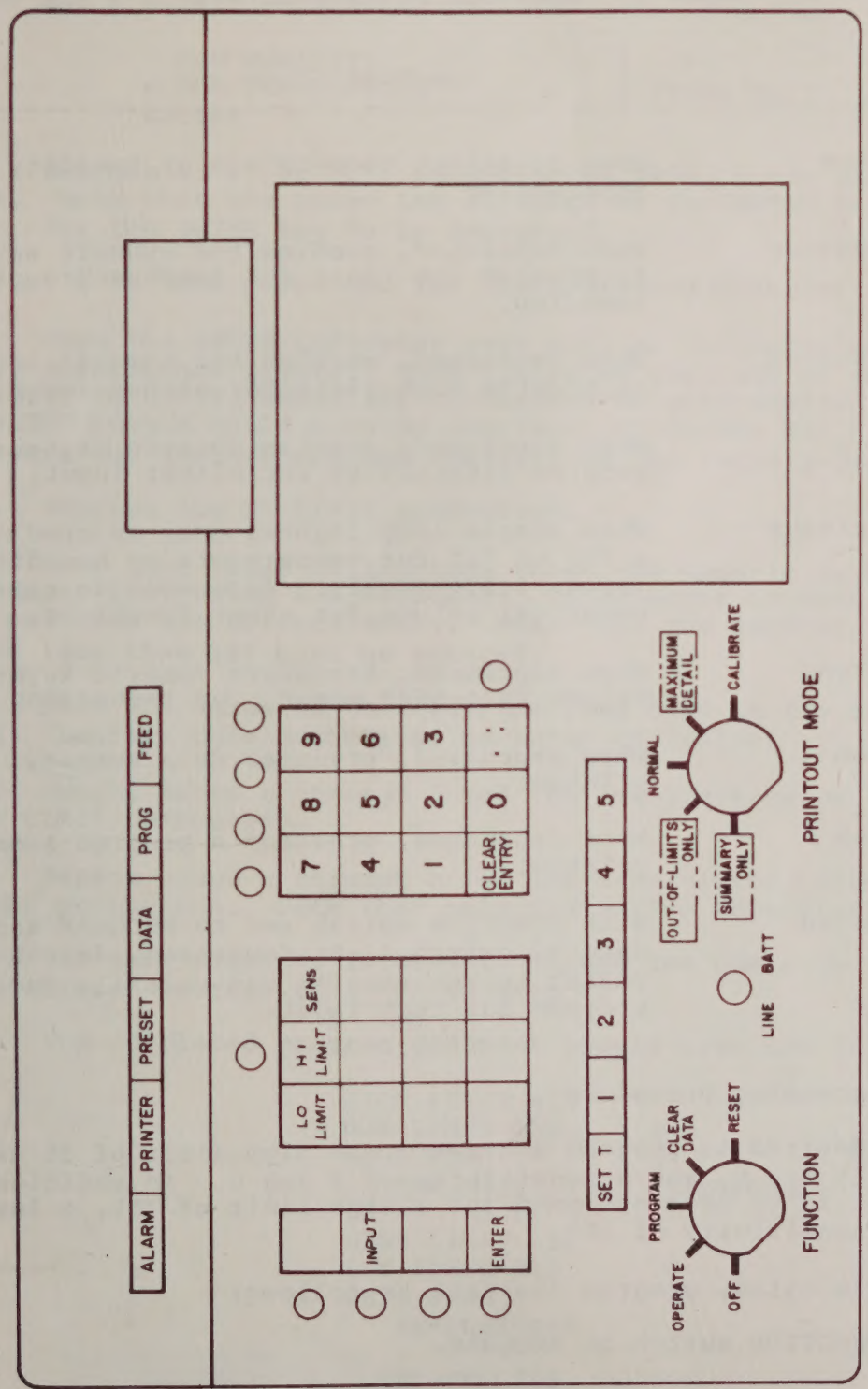


Figure 2. Typical Front Panel with 5008 Installed in Mainframe

Table 2. 6008 Operating Controls

Item	Function
INPUT pushbutton	Used to select temperature or humidity programming
LO LIMIT pushbutton	When depressed, enables the numeric keyboard to program low limit for temperature or humidity.
HI LIMIT pushbutton	When depressed, enables the numeric keyboard to program high limit for either input.
SENS pushbutton	When depressed, enables numeric keyboard to program sensitivity for either input.
NUMERIC pushbuttons	When single lamp lights, user is cued to press a "0" or "1" for temperature or humidity input, respectively. Also used to enter numerical values for other functions.
ENTER pushbutton	When depressed, transfers numeric keyboard values into 6008 memory for processing.
DATA pushbutton	When depressed, produces data summary printout.
PROG pushbutton	When depressed, produces a program summary printout.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that input.

6.2 Programming Procedure

Assume it is desired to program a temperature high limit of 35 deg C, a low limit of 15 deg C, and a sensitivity of 3 deg C. In addition, the humidity input is to be programmed for a high limit of 75%, a low limit of 35% and a sensitivity of 10%.

For the example cited, program the 6008 as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red LED next to the INPUT pushbutton is lit. Press the INPUT pushbutton. Note that the following prompt message is printed and a single yellow LED is lit.

```
1 FOR HUMIDITY
Ø FOR TEMPERATURE          ↑ (read up)
ENTER:
```

d. Depress a "Ø" or "1", depending on which input you wish to change. Note that the green LED adjacent to the ENTER key is lit, waiting for the ENTER key to be depressed.

(assume a "Ø" was depressed for the following example)

e. When the ENTER indicator goes out, an indicator above the center bank of pushbuttons lights. This indicates that one of the functions (HI LIMIT, LO LIMIT, SENSITIVITY) may now be programmed. At this time the PRESET button could also be depressed to change all of the parameters for temperature and humidity to the factory-preset values.

f. Depress the HI LIMIT pushbutton.

g. Note that three yellow LEDS above the numeric keyboard are now lit. Enter Ø35, using the keyboard. If an error is made, depress CLEAR ENTRY and then the correct entry. Note that the leading zero for numbers less than 1ØØ must be entered.

h. When the value is entered, the lamp next to the ENTER pushbutton lights. Depress this pushbutton to enter the value.

i. Repeat steps c through h for the low limit value (Ø15), using the LO LIMIT pushbutton.

j. Repeat steps c through h for the sensitivity value (Ø3), using the SENS pushbutton. Note that only two yellow LEDs light in step g.

k. The same sequence is used to change the humidity input, except a "1" is entered instead of a "Ø" in step c.

l. The completed program printout should take the following form:

```
HIGH LIMIT Ø75
LOW LIMIT Ø35          ↑
SENS Ø1Ø               |
   HUMIDITY            | (read up)

HIGH LIMIT Ø35         |
LOW LIMIT Ø15          |
SENS ØØ3               |
   TEMPERATURE         ↓

  626-PA-6ØØ8
      CH2

PROGRAM SUMMARY
```

NOTE

The instrument is designed to detect an invalid entry. For example, if the high limit value is selected as 30 deg C, and the user selects a low limit value of 35 deg C, the following printout will appear.

HI LIMIT Ø3Ø
LO LIMIT Ø29

m. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he (she) may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program currently in effect may be obtained by simply depressing the PROG pushbutton.

7 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6ØØ8, it is recorded and displayed in characteristic manner.

7.1 Over Limit for Temperature or Humidity

An over limit condition exists when the monitored averaged value of temperature or humidity exceeds the user-specified upper limit for the respective input. An over limit condition is indicated by a printout such as the following:

4T HI 1Ø:47:12.98
or
4H HI 1Ø:47:Ø9.76

where the 4 is the channel number, the T is for temperature, the H is for humidity, and the time is given in hours, minutes and seconds (to Ø.Ø1 sec resolution).

When the temperature or humidity recovers to normal, a printout such as the following occurs:

4T NOR 1Ø:55:13.77
Ø73.3 DEG C MAX
or
4H NOR 11:12:34.21
Ø65.5 % RH MAX

indicating when the normal temperature or humidity was restored and the value of the highest temperature or humidity reached during the over limit interval.

7.2 Under Limit for Temperature or Humidity

An under limit condition exists when the monitored temperature or humidity goes below the user-specified lower limit. An under limit condition is indicated by a printout such as the following:

```
4T LO 13:33:23.78
      or
4H LO 12:59:00.01
```

When the temperature or humidity returns to normal, a message such as the following is printed:

```
4T NOR 13:44:56.98
   003.1 DEG C MIN
         or
4H NOR 12:59:58.99
   024.2 % RH MIN
```

indicating when the normal condition was restored and the value of the lowest temperature or humidity reached during the under limit interval.

7.3 Temperature or Humidity Change

A temperature or humidity printout is triggered when the temperature or humidity changes more than a preselected amount from the last printed value. The change sensitivity is a user selected value, selected independently for temperature or humidity. The following example shows several temperature and humidity changes.

Printout	Remarks
2T DEC 01:22:34.76	Temperature decreased to 13.3 deg C
013.3 DEG C	at the time shown
2H INC 01:23:55.32	Humidity increased to 87.3 % RH
087.3 % RH	at the time shown

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 2 and that the limits for Channel 2 were programmed as follows:

```
T LOW LIMIT       20 DEG C
T HIGH LIMIT      30 DEG C
T SENSIVITY       02 DEG C

H LOW LIMIT       25 % RH
H HIGH LIMIT      75 % RH
H SENSITIVITY     05 % RH
```

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button. The following is an example of a DATA summary:

```
TIME= 0000.6 MIN   time spent HI for humidity
MAX  102.1 % RH    max humidity value for day
HIGH  001 HT       number of high excursions
TIME= 0001.0 MIN   time spent LO for humidity
MIN  000.1 % RH    min. humidity value for day
LOW   002 HT       number of low excursions
PRES=070.4 % RH    present humidity level
   HUMIDITY
TIME= 0002.2 MIN   (same as above, except
MAX  032.8 DEG C      for temperature)
HIGH  003 HT
TIME= 0032.4 MIN
MIN  018.5 DEG C
LOW   020 HT
PRES=031.4 DEG C                ↑
  TEMPERATURE

  626-PA-6008                (Read up)
      CH2

TIME = 10:48:15.99
     DAY # 45
   DATA SUMMARY

2T NOR 12:56.38.51     Printout of over limit
   078.2 DEG C         in OUT-OF-LIMITS ONLY mode

2T HI 12:56:34.52

2H NOR 03:55:45.98
   013.5 % RH

2H INC 03:53:34.89
   024.8 % RH

2H INC 03:50:57.67     Printout of under limit
   019.3 % RH          in NORMAL mode.

2H DEC 03:40.11.23
   013.5 % RH

2H DEC 03:39:45.33              ↑
   021.1 % RH

2H LO 03:39:45.33          (Read Up)
```

8 SYSTEM CHECK

When the PRINTOUT mode switch is set to SYSTEM CHECK, the precision reference signals are applied to the measuring circuitry. The probe inputs are disconnected during this time. These signals verify the functionality of the module, but not the actual sensors. The sensors can be checked by use of a calibrated standard (for temperature, a precise temperature chamber; and for humidity, a low and high end calibration salt bath). The allowable tolerance levels are described below, along with a sample printout:

```
**********************
     V2 =Ø10.2          +/-Ø.3
     V1 =Ø91.9          +/-Ø.6

    626-PA-6ØØ8
       CH2                          ↑ (Read Up)

  TIME = 12:34:56.78
  ***SYSTEM CHECK***

  **********************
```

9 SHORT TERM ACCUMULATOR

If disturbances should take place at a rate faster than the 626 mainframe can process and print them out (and the internal event stack memory should overflow), then subsequent events until the overflow condition is cleared, are stored in summary form in the Short Term Accumulators. These values are cleared out after the printout of the Short Term Accumulators is complete. The format is identical to the Data Summary except there are no accumulated time values, and the values are printed out only when a HI or LO limit was crossed to expedite the printing.

10. 626 MODULE CAPACITY

The 626 standard mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 units, and individual modules have load ratings as follows:

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	3 Units
626-PA-6014	1 Unit

When selecting modules for installation in any mainframe, simply verify that the sum of the load ratings of the installed modules does not exceed 20.

11. Standard Accessories

Model No.	Part No.	Quan.	Description
626-PA-6008	TM111025	1	Operating Manual
	111061	1	Humidity Probe
	111059	1	Temperature Probe

12 FACTORY REPAIR

When factory repair is desired, proceed as follows:

1. Contact the Dranetz Engineering Customer Service Department and obtain an Authorization Number.
2. Fill out the Repair/Service Order enclosed in this manual and ship it with the equipment to the Customer Service Department.

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